



LOWELL CONTRIBUTORY RETIREMENT SYSTEM

ACTUARIAL VALUATION

as of

January 1, 2019

Prepared by:

KMS Actuarial, LLC
52 Hunt Road
Kingston, NH 03848

October, 2019



October 9, 2019

Lowell Contributory Retirement Board
City Hall, Room 3
375 Merrimack Street
Lowell, MA 01852

Dear Board Members:

We are pleased to present the enclosed report providing the results of our actuarial valuation of the Lowell Contributory Retirement System as of January 1, 2019. Our valuation was performed in accordance with the provisions contained in Chapter 32 of the Massachusetts General Laws, "M.G.L.", as of January 1, 2019. Disclosures under GASB Statement No. 67, Financial Reporting for Pension Plans (GASB 67) and GASB Statement No. 68, Accounting and Financial Reporting for Pensions (GASB 68) are provided in a separate report.

The principal results of our valuation are summarized in Section 2. The Summary of Plan Provisions and Actuarial Methods and Assumptions are shown in Sections 5 and 6, respectively. Section 7 summarizes the demographic profile of active members, retired plan members and beneficiaries and disabled plan members. Asset information and actuarial liabilities are presented in Section 2. The development of the required appropriations pursuant to Chapter 32 of the M.G.L. is shown in Section 3, including a 30-year forecast of the required appropriations and projected cash flows. The summary of information for PERAC is presented in Section 4.

This valuation is based upon member data provided by the Lowell Contributory Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Retirement Board. Although we did not audit the data used in the valuation, we believe that the information is complete and reliable.

Liabilities presented in this report are based on a long-term investment return rate assumption of 7.65%, net of investment expense, compounded annually.

This report was completed in accordance with generally accepted actuarial standards and procedures, and conforms to the Code of Professional Conduct of the American Academy of Actuaries. The actuarial assumptions used in the determination of costs are reasonably related to the experience of the System and to reasonable expectations, and represent our best estimate of anticipated long-term experience under the System.

K M S A C T U A R I E S

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Future actuarial valuation results may differ significantly from the current results presented in this report. Examples of potential sources of volatility include plan experience differing from that anticipated by the economic or demographic assumptions, the effect of new entrants, changes in economic or demographic assumptions, the effect of law changes and the delayed effect of smoothing techniques.

Our valuation follows generally accepted actuarial methods and we perform such tests as we consider necessary to assure the accuracy of the results. The amounts presented in this report have been appropriately determined according to the actuarial assumptions and methods stated herein.

This report is intended for the sole use of the Lowell Contributory Retirement System and is intended to provide information to comply with the stated purpose of the report. It may not be appropriate for other purposes.

The undersigned credentialed actuaries are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinion contained herein. They are available to answer any questions with regard to this report.

Respectfully submitted,



Linda L. Bournival, FSA
Member, American Academy of Actuaries
(603) 792-9494



Amanda J. Makarevich, ASA
Member, American Academy of Actuaries
(603) 702-8009



David M. Mirabito, FSA
Member, American Academy of Actuaries
(978) 766-5532

TABLE OF CONTENTS

SECTION 1 -	SUMMARY	1
SECTION 2 -	PRINCIPAL VALUATION RESULTS	6
	Exhibit 2.1 - PLAN ASSETS	
	Exhibit 2.2 - ACTUARIAL PRESENT VALUE OF FUTURE BENEFITS	
	Exhibit 2.3 - ACTUARIAL ACCRUED LIABILITY	
	Exhibit 2.4 - UNFUNDED ACTUARIAL ACCRUED LIABILITY	
	Exhibit 2.5 - NORMAL COST	
	Exhibit 2.6 - ACTUARIAL EXPERIENCE	
SECTION 3 -	CHAPTER 32 OF M.G.L. APPROPRIATIONS	14
	Exhibit 3.1 - ANNUAL APPROPRIATIONS	
	Exhibit 3.2 - 30-YEAR FORECAST OF ANNUAL APPROPRIATIONS	
	Exhibit 3.3 - 30-YEAR FORECAST OF CASH FLOW	
SECTION 4 -	REQUIRED DISCLOSURES	18
	Exhibit 4.1 - GASB 67 AND GASB 68 DISCLOSURES	
	Exhibit 4.2 - PERAC DISCLOSURE INFORMATION	
SECTION 5 -	SUMMARY OF PLAN PROVISIONS	20
SECTION 6 -	ACTUARIAL ASSUMPTIONS AND METHODS	25
SECTION 7 -	PLAN MEMBER INFORMATION	29
	Exhibit 7.1 - ACTIVE MEMBERS BY AGE and YEARS OF SERVICE	
	Exhibit 7.2 - RETIRED and DISABLED PLAN MEMBERS and BENEFICIARIES	
SECTION 8 -	GLOSSARY OF TERMS	31

SECTION 1 - SUMMARY

Background

We have completed the Actuarial Valuation of the Lowell Contributory Retirement System as of January 1, 2019. This valuation is based upon census data provided by the Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Lowell Contributory Retirement Board. Information for the prior valuation completed as of January 1, 2017 was obtained from the valuation report prepared by KMS Actuaries, LLC.

Massachusetts General Laws

The valuation was prepared in accordance with Chapter 32 of the Massachusetts General Laws ("M.G.L."). The results are based on the active, inactive and retired members and beneficiaries as of January 1, 2019, the assets as of December 31, 2018 and assumptions regarding investment returns, salary increases, death, turnover, disability and retirement.

The valuation does not take into consideration:

- Changes in the law after the valuation date,
- Transfers between retirement systems pursuant to Section 3(8)(c) of Chapter 32,
- State-mandated benefits and
- Cost-of-living increases granted to members in pay status between 1982 and 1997.

GASB Statement Numbers 67 and 68

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, Financial Reporting for Pension Plans, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, Accounting and Financial Reporting for Pensions, replaced the requirements of Statement No. 27.

The new pension standards reflect changes from those previously in place regarding how governments calculate total pension liability and pension expense. Further, the new standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

The required disclosures and notes under the new GASB Statements for the fiscal year ending December 31, 2018 are provided in a separate report.

SECTION 1 - SUMMARY

Actuarial Valuation

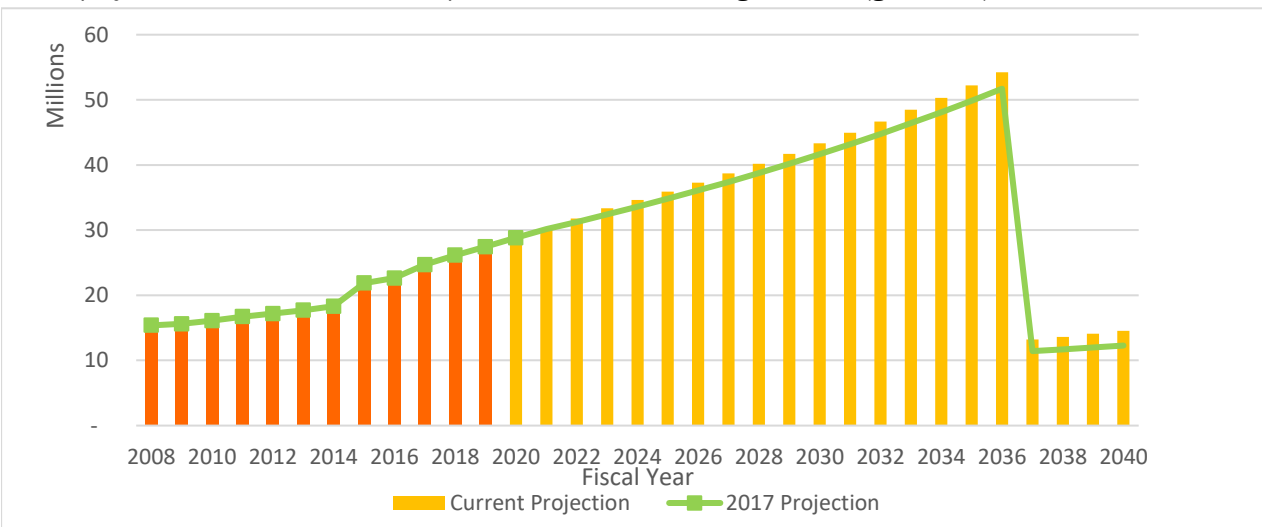
During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease from \$269,764,647 as of January 1, 2017 to \$264,732,529 as of January 1, 2019, for a total decrease of \$5,032,118. The actual unfunded actuarial accrued liability, before any assumption or plan changes, was \$270,566,384, resulting in an actuarial loss of \$5,833,855. The actuarial loss was primarily due to an asset loss of \$4,422,313 and a demographic experience loss of \$1,411,541. The details of the gain and loss analysis are provided in Exhibit 2.6.

Appropriations

The funding appropriation for each year is computed as the sum of the normal cost, net 3(8)(c) transfers and an amortization payment to pay off the Unfunded Actuarial Liability, adjusted for annual payments of the appropriation made July 1. The appropriation calculated as of the January 1, 2019 valuation is \$29,066,491, and is made up of a normal cost payment of \$6,683,051, net 3(8)(c) transfers of \$722,860, and an amortization payment of \$21,660,580. The amortization method is an increasing amortization of the unfunded actuarial accrued liability at 4% over 17 years and is expected to fully pay the unfunded actuarial accrued liability by the year 2036. The development of the appropriation as of January 1, 2019 is presented in Exhibit 3.1.

For fiscal year 2020, we show the actual appropriation developed under the previous funding schedule and reported on the PERAC "Required Fiscal Year 2020 Appropriation" letter dated November 14, 2018 of \$28,821,259. For fiscal year 2021, we developed an annual appropriation of \$30,262,322, which is made up of a normal cost and net 3(8)(c) transfers of \$7,926,655 and payment toward the unfunded actuarial accrued liability of \$22,335,667. The unfunded actuarial accrued liability is expected to be fully paid by 2036. The Board adopted a schedule that limits the annual increase in appropriation to 5% for each year. The current funding schedule is shown in Exhibit 3.2.

The chart below shows the historical (orange bars) and projected (yellow bars) annual appropriations compared to the projected amounts shown in the prior valuation and funding schedule (green line).

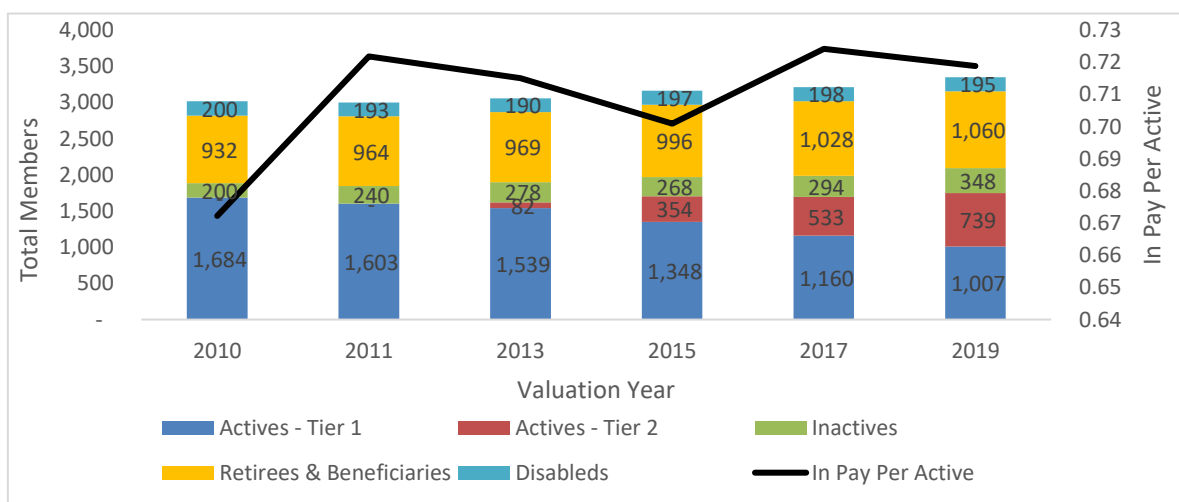


Lowell Contributory Retirement System
Actuarial Valuation as of January 1, 2019

SECTION 1 - SUMMARY

A summary of principal valuation results from the current valuation and the prior valuation follows. Changes in actuarial assumptions and methods and Plan provisions are discussed below, as well as changes in census data and asset information.

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>	<u>Increase/ (Decrease)</u>
Summary of Member Data			
Active Members	1,746	1,693	3.1%
Average Age	46.4	46.8	(0.9%)
Average Service	12.6	13.1	(3.8%)
Valuation Salary	\$98,524,601	\$92,810,806	6.2%
Average Salary	\$56,429	\$54,820	2.9%
Retired Members and Beneficiaries			
Retired Members and Beneficiaries	1,060	1,028	3.1%
Average Age	72.8	72.7	0.1%
Total Annual Retirement Allowance	\$30,801,937	\$28,023,215	9.9%
Average Annual Retirement Allowance	\$29,058	\$27,260	6.6%
State Reimbursed COLAs	\$161,418	\$193,616	(16.6%)
Total System-Funded Retirement Allowance	\$30,640,519	\$27,829,599	10.1%
Disabled Members			
Disabled Members	195	198	(1.5%)
Average Age	65.8	66.0	(0.3%)
Total Annual Retirement Allowance	\$8,439,366	\$7,916,762	6.6%
Average Annual Retirement Allowance	\$43,279	\$39,984	8.2%
State Reimbursed COLAs	\$84,122	\$109,309	(23.0%)
Total System-Funded Retirement Allowance	\$8,355,244	\$7,807,453	7.0%
Inactive Members			
Inactive Members	348	294	18.4%
Annuity Savings Fund	\$6,541,557	\$6,304,050	3.8%



SECTION 1 - SUMMARY

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>	<u>Increase/ (Decrease)</u>
Funded Status - Market Value of Assets			
Actuarial Accrued Liability (AAL)	\$664,270,790	\$613,481,727	8.3%
Market Value of Assets (MVA)	\$367,981,493	\$329,424,819	11.7%
Unfunded Accrued Liability	\$296,289,297	\$284,056,908	4.3%
Funded Status	55.4%	53.7%	3.2%
Funded Status - Actuarial Value of Assets			
Actuarial Accrued Liability (AAL)	\$664,270,790	\$613,481,727	8.3%
Actuarial Value of Assets (AVA)	\$386,905,773	\$343,717,080	12.6%
Unfunded Accrued Liability	\$277,365,017	\$269,764,647	2.8%
Funded Status	58.2%	56.0%	3.9%
Normal Cost			
Total Normal Cost	\$15,425,214	\$14,902,167	3.5%
Employee Normal Cost	9,142,163	8,493,702	7.6%
Administrative Expenses	400,000	400,000	0.0%
Net Employer Normal Cost	\$6,683,051	\$6,808,465	(1.8%)
Appropriations			
Fiscal Year 2019	N/A	\$27,448,818	N/A
Fiscal Year 2020	\$28,821,259	\$28,821,259	0.0%
Fiscal Year 2021	\$30,262,322	\$30,160,148	0.3%
Fiscal Year 2022	\$31,775,438	\$31,260,601	1.6%

Actuarial Assumptions and Methods

Most Actuarial Assumptions and Methods used in this valuation remain the same since the last valuation, except the investment return rate was reduced from 7.75% to 7.65% and an assumption was added for annually funding 3(8)(c) transfers of \$750,000. Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of \$6,798,633 and an increase in the employer normal cost of \$312,409. The Actuarial Assumptions and Methods utilized in this valuation are detailed in Section 6, Actuarial Assumptions and Methods.

Plan Provisions

All Plan provisions used in this valuation are the same as those used in the prior valuation, and are summarized in Section 5, Summary of Plan Provisions.

SECTION 1 - SUMMARY

Census Data

As of January 1, 2019, there are 1,746 active members who may be eligible for benefits in the future, 1,060 retirees and beneficiaries, 348 inactives and 195 disabled retirees. Summaries of the active, retired and disabled employees are included in Section 7, Demographic Information.

Assets

This valuation is based upon asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Lowell Contributory Retirement Board. The market value of assets increased from \$329,424,819 as of December 31, 2016 to \$367,981,493 as of December 31, 2018. During the plan years ended 2017 and 2018, the market value rates of return were 17.27% and -1.74%, respectively.

The actuarial value of assets increased from \$343,717,080 as of January 1, 2017 to \$386,905,773 as of January 1, 2019. During the plan years ended 2017 and 2018, the rates of return on the actuarial value of assets were 8.35% and 5.94%, respectively.

SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.1 - Plan Assets

Asset information is reported annually to the Public Employee Retirement Administration Commission by the Lowell Contributory Retirement System. The Market Value of Assets for the three most recent calendar years are as follows:

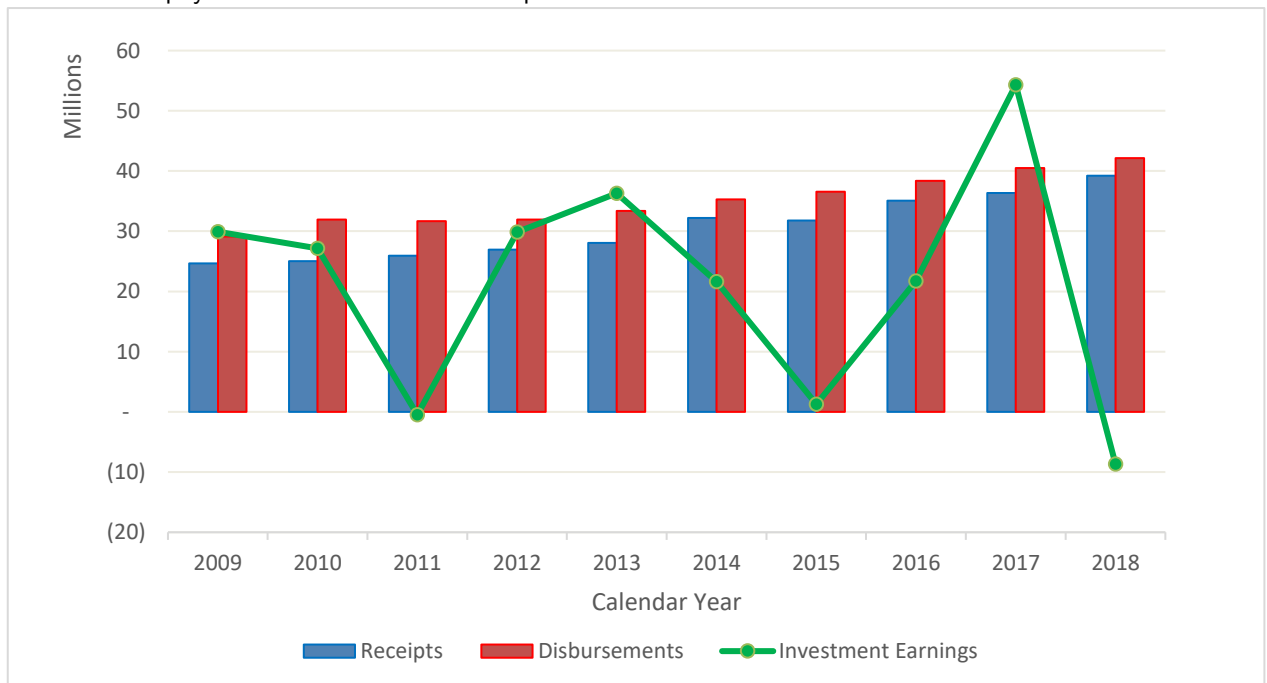
Calendar Year	2018	2017	2016
Trust Fund Composition at Year-End			
Cash	\$10,066,917	\$10,036,689	\$9,048,763
Short-Term Investments	0	0	0
Fixed Income Securities	0	0	0
Equities	0	0	0
Pooled Short Term Funds	0	0	0
Pooled Domestic Equity Funds	0	0	0
Pooled International Equity Funds	0	0	0
Pooled Global Equity Funds	0	0	0
Pooled Domestic Fixed Income Funds	0	0	0
Pooled International Fixed Income Funds	0	0	0
Pooled Global Fixed Income Funds	0	0	0
Pooled Alternative Investments	418,618	488,912	653,098
Pooled Real Estate Funds	0	594	140,499
Pooled Domestic Balanced Funds	0	0	0
Pooled International Balanced Funds	0	0	0
Hedge Funds	0	0	0
PRIT Cash	1,003,187	1,444	400,936
PRIT Fund	356,475,342	369,053,213	319,181,523
Interest Due & Accrued	17,429	9,523	0
Prepaid Expenses	0	0	0
Accounts Receivable	0	0	0
Land	0	0	0
Buildings	0	0	0
Accumulated Depreciation - Buildings	0	0	0
Accounts Payable	0	0	0
Total Market Value of Assets	<u>\$367,981,493</u>	<u>\$379,590,375</u>	<u>\$329,424,819</u>

SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.1 - Plan Assets

Calendar Year	2018	2017	2016
Funds			
Annuity Savings Fund	\$101,304,821	\$99,178,584	\$96,340,991
Annuity Reserve Fund	32,983,788	31,619,373	31,692,361
Special Military Service Fund	16,864	16,847	16,831
Pension Fund	0	9,701	0
Expense Fund	0	0	0
Pension Reserve Fund	233,676,020	248,765,870	201,374,636
Total Market Value of Assets	\$367,981,493	\$379,590,375	\$329,424,819
Asset Activity			
Market value as of Beginning of Year	\$379,590,375	\$329,424,819	\$310,929,041
Contributions and Receipts	39,200,085	36,355,855	35,095,387
Benefit Payments and Expenses	(42,145,146)	(40,507,244)	(38,349,054)
Investment Return	(8,663,821)	54,316,945	21,749,445
Market Value as of End of Year	\$367,981,493	\$379,590,375	\$329,424,819
Rate of Return	-1.74%	17.27%	7.58%

Below are the receipts and disbursements during the last 10 years. The green line reflects investment gains and losses, which vacillate as investment markets fluctuate. Blue bars indicate contributions, from employees and employers, and red bars show benefit payments and administrative expenses.



SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.1 - Plan Assets

The Actuarial Value of Assets is the market value of assets as of the valuation date adjusted to phase in investment gains and losses over a 5-year period, further constrained to be within 10% of the market value of assets. Investment gains and losses are the excess or deficiency of the expected returns over the actual returns.

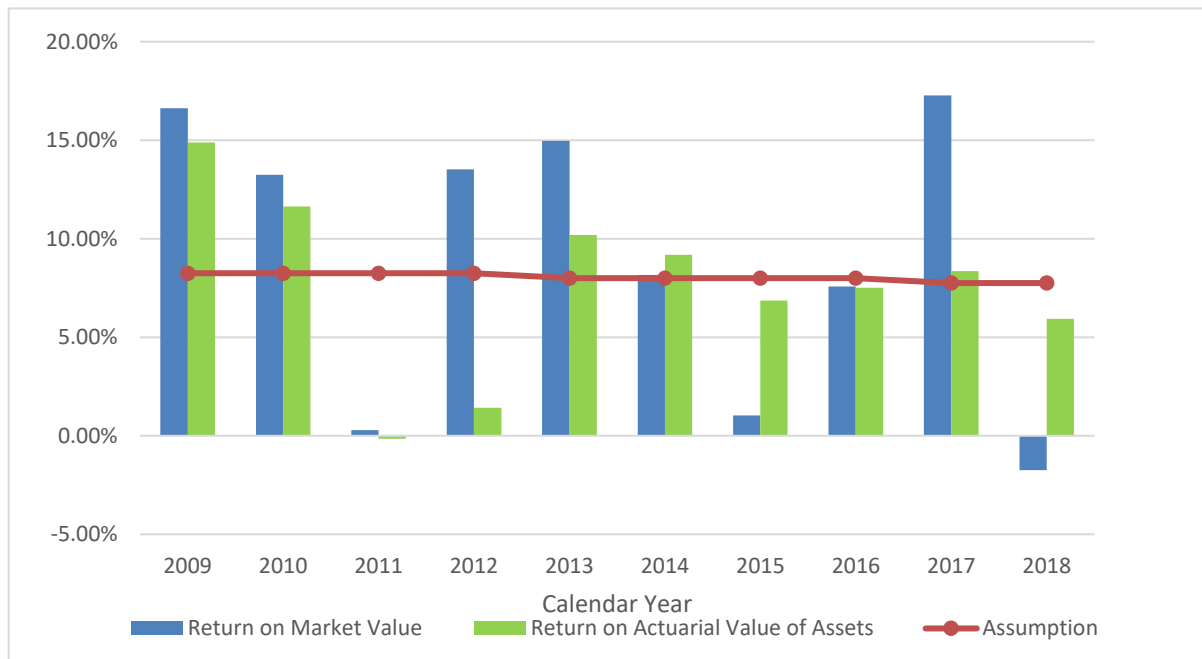
Valuation Date	1/1/2019	1/1/2018	1/1/2017
1. Market Value of Assets as of prior January 1	\$379,590,375	\$329,424,819	\$310,929,041
a. Prior Year Contributions and Receipts	39,200,085	36,355,855	35,095,387
b. Prior Year Benefit Payments and Expenses	(42,145,146)	(40,507,244)	(38,349,054)
c. Expected Investment Return Rate	7.75%	7.75%	8.00%
d. Expected Investment Return	29,294,623	25,356,152	24,733,331
e. Expected Market Value of Assets as of Valuation Date	\$405,939,937	\$350,629,582	\$332,408,705
2. Prior Year Gain / (Loss)			
a. Market Value of Assets as of January 1	\$367,981,493	\$379,590,375	\$329,424,819
b. Expected Market Value of Assets	405,939,937	350,629,582	332,408,705
c. Prior Year Gain / (Loss)	(37,958,444)	28,960,793	(2,983,886)
3. Phase-In of Asset Gains and Losses			
	Unrecognized	Unrecognized	Unrecognized
Calendar Year	Gain / (Loss)	Gain / (Loss)	Gain / (Loss)
a. 2018	(\$37,958,444)	(\$30,366,755)	-
b. 2017	28,960,793	17,376,476	23,168,634
c. 2016	(2,983,886)	(1,193,554)	(1,790,332)
d. 2015	(23,702,235)	(4,740,447)	(9,480,894)
e. 2014	(1,887,986)	-	(377,597)
f. Total deferred gains/(losses)	(18,924,280)	11,519,811	(14,292,261)

SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.1 - Plan Assets

Valuation Date	1/1/2019	1/1/2018	1/1/2017
4. Actuarial Value of Assets			
a. Market Value of Assets	\$367,981,493	\$379,590,375	\$329,424,819
b. Deferred gains/(losses)	(18,924,280)	11,519,811	(14,292,261)
c. Market Value of Assets Less deferred gains/(losses)	\$386,905,773	\$368,070,564	\$343,717,080
d. 90% of Market Value of Assets	331,183,344	341,631,338	296,482,337
e. 110% of Market Value of Assets	404,779,642	417,549,413	362,367,301
f. Actuarial Value of Assets, a., but not less than b. and not greater than c.	\$386,905,773	\$368,070,564	\$343,717,080
g. Ratio of Actuarial Value of Assets to Market Value of Assets	105.14%	96.97%	104.34%
5. Rate of Return on Actuarial Value of Assets for Prior Calendar Year	5.94%	8.35%	7.52%

Below are the investment returns during the last 10 years. The red line reflects the investment return actuarial assumption. Blue bars indicate investment return rates on market value of assets, and green bars show investment return rates on actuarial value of assets.



SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.2 - Actuarial Present Value of Future Benefits

The **Actuarial Present Value of Future Benefits** is the present value of the cost to finance all benefits payable in the future, discounted to reflect the probability of payment and the time value of money. Below is the Actuarial Present Value of Future Benefits from the current valuation and the prior valuation:

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>
Actives	\$412,282,324	\$389,695,240
Retired Members and Beneficiaries	299,222,648	268,709,069
Disabled Members	92,339,530	86,042,257
Inactive Members	6,541,557	6,304,050
Total Present Value of Future Benefits	<u>\$810,386,059</u>	<u>\$750,750,616</u>

Exhibit 2.3 - Actuarial Accrued Liability

The **Actuarial Accrued Liability** is the portion of the Actuarial Present Value of Future Benefits which is allocated to all periods prior to a valuation year and therefore is not provided for by future Normal Costs. Below is the Actuarial Accrued Liability from the current valuation and the prior valuation:

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>
Actives	\$266,167,055	\$252,426,351
Retired Members and Beneficiaries	299,222,648	268,709,069
Disabled Members	92,339,530	86,042,257
Inactive Members	6,541,557	6,304,050
Total Actuarial Accrued Liability	<u>\$664,270,790</u>	<u>\$613,481,727</u>

Exhibit 2.4 - Unfunded Actuarial Accrued Liability

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>
Unfunded Actuarial Accrued Liability		
a. Actuarial Accrued Liability	\$664,270,790	\$613,481,727
b. Actuarial Value of Assets	386,905,773	343,717,080
c. Unfunded Actuarial Accrued Liability (a. - b.)	\$277,365,017	\$269,764,647
d. Funded Ratio (b. divided by a.)	58.2%	56.0%

SECTION 2 - PRINCIPAL VALUATION RESULTS

Below are the accrued liabilities, asset values (actuarial and market) and funded status during the last 10 years. The black solid line reflects the funded status on an actuarial value of assets (AVA) basis and the black dotted line reflects the funded status on a market value (MVA) basis. Blue bars indicate actuarial accrued liabilities, red bars indicate actuarial value of assets and green bars indicate market value of assets.

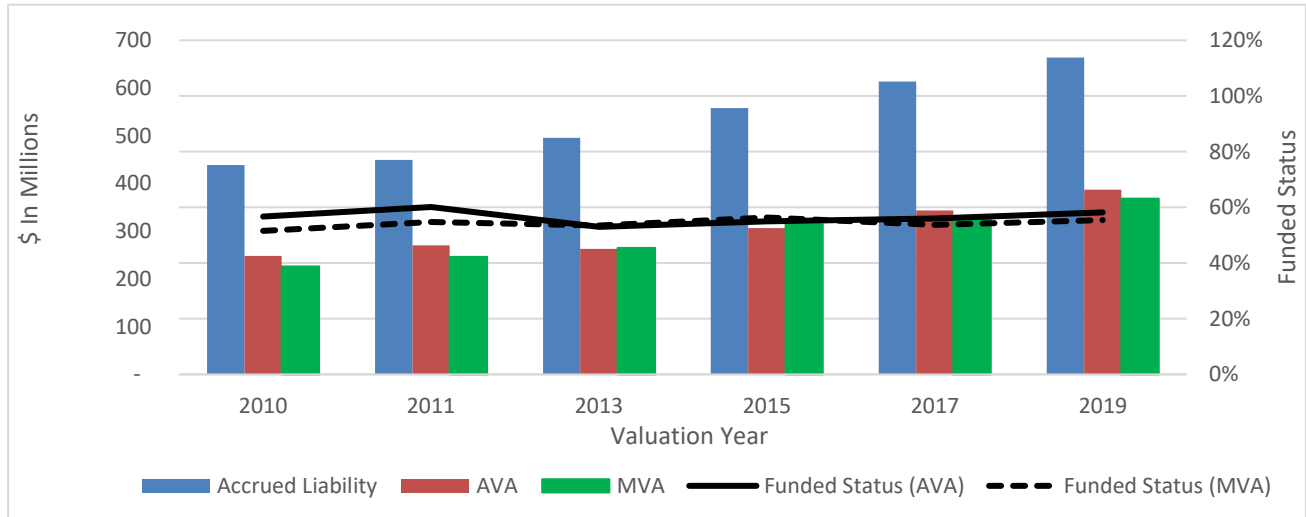


Exhibit 2.5 - Normal Cost

The **Normal Cost** is the portion of the Actuarial Present Value of Future Benefits which is allocated to a valuation year. Only active employees who have not reached Normal Retirement Age incur a Normal Cost. Below is the Normal Cost from the current valuation and the prior valuation:

Valuation Date	<u>1/1/2019</u>	<u>1/1/2017</u>
Total Normal Cost	\$15,425,214	\$14,902,167
As of Percentage of Salary	15.7%	16.1%
Employee Normal Cost	\$9,142,163	\$8,493,702
As of Percentage of Salary	9.3%	9.2%
Administrative Expenses	\$400,000	\$400,000
As a Percentage of Salary	0.4%	0.4%
Net Employer Normal Cost	\$6,683,051	\$6,808,465
As a Percentage of Salary	6.8%	7.3%

SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.6 - Actuarial Experience

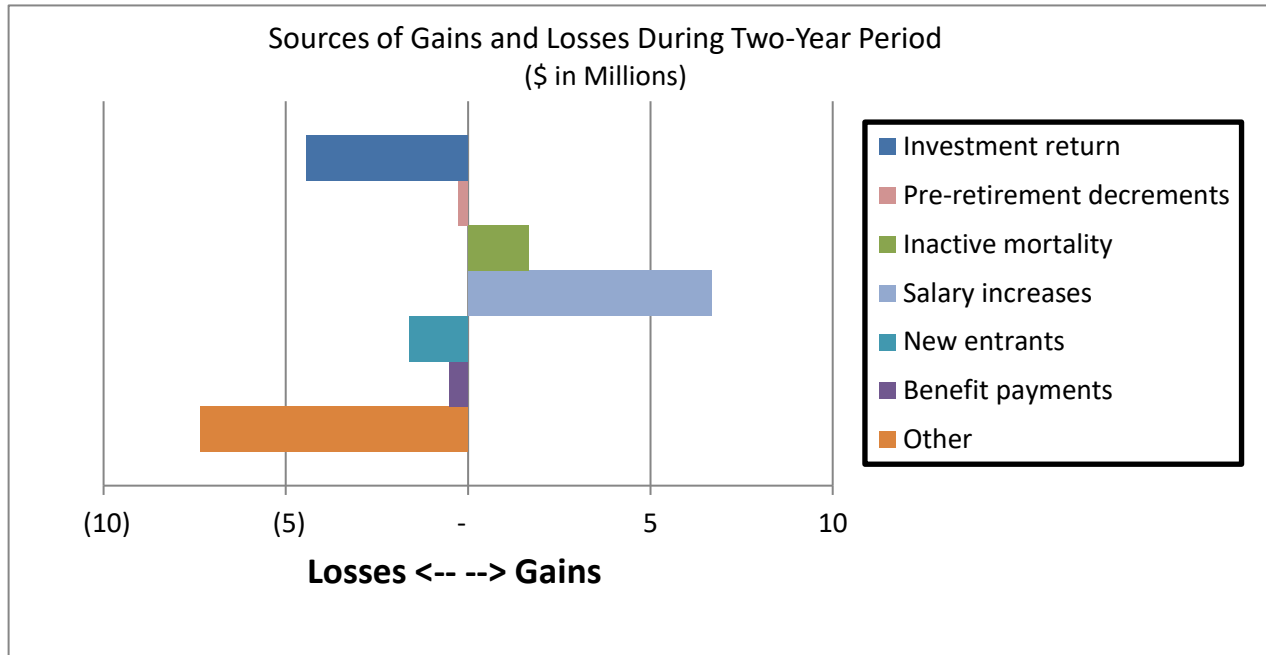
In performing the actuarial valuation, various assumptions are made regarding mortality, retirement, disability and withdrawal rates as well as salary increases and investment returns. A comparison of the results of the current valuation and the prior valuation is made to determine how closely actual experience relates to expected. During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease by \$5,032,118. Below is the development of the Actuarial Loss for the current 2-year period:

Calendar Year Ending	<u>12/31/2018</u>	<u>12/31/2017</u>
Expected Unfunded Actuarial Accrued Liability		
a. Unfunded Actuarial Accrued Liability, beginning of year	\$268,846,449	\$269,764,647
b. Normal cost, beginning of year	14,752,810	14,902,167
c. Total contributions	39,200,085	36,355,855
d. Interest (full year on a. and b., 13/24ths on c.)	20,333,356	20,535,490
e. Expected Unfunded Actuarial Accrued Liability	\$264,732,529	\$268,846,449
f. Unfunded Actuarial Accrued Liability (before changes)	270,566,384	
g. (Gain)/Loss	\$5,833,855	
Asset (gain)/loss		
a. Actuarial value of assets, beginning of year	\$368,070,564	\$343,717,080
b. Contributions and Receipts	39,200,085	36,355,855
c. Benefit Payments and Expenses	(42,145,146)	(40,507,244)
d. Assumed rate of return (prior valuation)	7.75%	7.75%
e. Expected return	28,401,838	26,463,802
f. Actuarial value of assets, end of year	386,905,773	368,070,564
g. Actual return	21,780,270	28,504,873
h. Actual rate of return	5.94%	8.35%
i. Asset (gain)/loss	\$6,621,568	(\$2,041,071)
j. Total asset (gain)/loss, 2-year period	\$4,422,313	

SECTION 2 - PRINCIPAL VALUATION RESULTS

Exhibit 2.6 - Actuarial Experience

Below are the various sources of gains and losses over the 2-year period. The asset loss during the period was \$4,422,313, and the total demographic loss during the period was \$1,411,541, which totals to an overall loss of \$5,833,855.



Actual Unfunded Actuarial Accrued Liability

a. Changes due to:	
i) Asset (gain)/loss	\$4,422,313
ii) (Gain)/loss from demographic experience	1,411,541
iii) (Gain)/loss prior to changes	5,833,855
iv) Plan change	-
v) Assumption change	6,798,633
vi) Total (gain)/loss (including changes)	12,632,488
b. Unfunded Actuarial Accrued Liability, end of year	\$277,365,017

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibit 3.1 - Annual Appropriations

The **Annual Appropriation** is determined in accordance with the requirements set forth in Section 22D of Chapter 32 of the Massachusetts General Laws ("M.G.L."). The appropriation is comprised of the annual employer normal cost and amortization payments to pay the unfunded actuarial accrued liability. Below are the details of the annual appropriations for the current and prior valuations, adjusted for semi-annual payments made each July 1 and January 1. The appropriations shown are based on the results of the valuations and do not account for any adjustments made to appropriations in the selected funding schedule.

Amortization Payments	<u>1/1/2019</u>	<u>1/1/2017</u>
a. Early Retirement Incentive Plan (2003)		
Fully Funded Year	2020	2020
Investment Return Rate	7.65%	7.75%
Balance as of valuation date	\$502,432	\$1,401,476
Amortization Amount	\$502,432	\$502,429
Increasing Rate	0.00%	0.00%
Remaining Payment Period (from Valuation date)	1	3
b. Unfunded Actuarial Accrued Liability		
Fully Funded Year	2036	2036
Balance as of valuation date	\$276,862,585	\$268,363,171
Amortization Amount	\$21,158,148	\$19,066,955
Increasing Rate	4.00%	4.00%
Remaining Payment Period (from Valuation date)	17	19
c. Total Amortization Payments	\$21,660,580	\$19,569,384
Normal Cost	\$6,683,051	\$6,808,465
Net 3(8)(c) Transfers	\$722,860	\$0
Total Appropriation as of January 1	\$29,066,491	\$26,377,849
Adjusted for Payments as of July 1	\$30,157,798	\$27,380,919

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibits 3.2 and 3.3 are based on the assumptions below:

Exhibit 3.2:

- The Employer Normal Cost is expected to increase 3.5% per year.
- The Unfunded Actuarial Accrued Liability ("UAL") is computed as of January 1 of each year assuming no future gains or losses.
- The Amortization Payment of UAL is an increasing payment at 4% paid over 17 years through 2036.
- The Amortization Payment of the Early Retirement Incentive Plan (2003) is a level payment paid over 1 year(s) through 2020.
- Net 3(8)(c) transfers are a level dollar amount based on the net transfers expected to be paid by the Lowell Contributory Retirement Board during the current year offset by the amount received during the same period.
- Total Employer Cost is the sum of the Employer Normal Cost, net 3(8)(c) transfers and the Amortization of the UAL (including ERIs), all computed as of January 1 of each year and adjusted for annual payments made on July 1.
- For fiscal year 2020, we show the actual appropriation developed under the previous funding schedule of \$28,821,259. For fiscal years 2021 and later, the Board has selected a funding schedule that fully amortizes the unfunded actuarial accrued liability by 2036, with annual employer costs limited to increases of 5% over the prior year.

Exhibit 3.3:

- Expected benefit payments include payments expected to be made to retired members, beneficiaries, disabled members and active members expected to retire. In addition, expected benefit payments include distribution of the annuity savings fund attributed to inactive members.
- Benefit payments exclude cost-of-living increases granted to members in pay status between 1982 and 1997. In addition, benefit payments are as expected for the first ten years of the forecast, then increase by the greater of 4.5% per year thereafter or the expected future payments for the current population projected by our computer model.
- Calendar year cash flow entries are developed as of each January 1.

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibit 3.2 - 30-Year Forecast of Annual Appropriations

Fiscal Year Ending	Employer Normal Cost	Amortization Payment of UAL	Amortization Payment of ERI 2003	Net 3(8)(c) Transfers	Total Employer Cost	Increase over Prior Year	Unfunded Actuarial Accrued Liability
2020	\$6,933,967	\$20,615,996	\$521,296	\$750,000	\$28,821,259		\$277,365,017
2021	7,176,655	22,335,667	-	750,000	30,262,322	5.00%	276,652,546
2022	7,427,838	23,597,600	-	750,000	31,775,438	5.00%	274,642,202
2023	7,687,812	24,905,928	-	750,000	33,343,740	4.94%	271,168,754
2024	7,956,885	25,902,165	-	750,000	34,609,050	3.79%	266,072,139
2025	8,235,376	26,938,252	-	750,000	35,923,628	3.80%	259,551,991
2026	8,523,614	28,015,781	-	750,000	37,289,395	3.80%	251,458,064
2027	8,821,941	29,136,413	-	750,000	38,708,354	3.81%	241,626,967
2028	9,130,708	30,301,870	-	750,000	40,182,578	3.81%	229,881,085
2029	9,450,282	31,513,945	-	750,000	41,714,227	3.81%	216,027,429
2030	9,781,042	32,774,502	-	750,000	43,305,544	3.81%	199,856,386
2031	10,123,379	34,085,482	-	750,000	44,958,861	3.82%	181,140,373
2032	10,477,698	35,448,901	-	750,000	46,676,599	3.82%	159,632,384
2033	10,844,417	36,866,858	-	750,000	48,461,275	3.82%	135,064,425
2034	11,223,972	38,341,533	-	750,000	50,315,505	3.83%	107,145,822
2035	11,616,811	39,875,194	-	750,000	52,242,005	3.83%	75,561,405
2036	12,023,399	41,470,201	-	750,000	54,243,600	3.83%	39,969,538
2037	12,444,218	-	-	750,000	13,194,218	-75.68%	-
2038	12,879,765	-	-	750,000	13,629,765	3.30%	-
2039	13,330,558	-	-	750,000	14,080,558	3.31%	-
2040	13,797,127	-	-	750,000	14,547,127	3.31%	-
2041	14,280,027	-	-	750,000	15,030,027	3.32%	-
2042	14,779,828	-	-	750,000	15,529,828	3.33%	-
2043	15,297,122	-	-	750,000	16,047,122	3.33%	-
2044	15,832,521	-	-	750,000	16,582,521	3.34%	-
2045	16,386,660	-	-	750,000	17,136,660	3.34%	-
2046	16,960,193	-	-	750,000	17,710,193	3.35%	-
2047	17,553,800	-	-	750,000	18,303,800	3.35%	-
2048	18,168,184	-	-	750,000	18,918,184	3.36%	-
2049	18,804,070	-	-	750,000	19,554,070	3.36%	-

Lowell Contributory Retirement System
Actuarial Valuation as of January 1, 2019

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibit 3.3 - 30-Year Forecast of Cash Flow

Calendar Year	Market Value of Assets, BOY	Benefit Payments	Employee Contributions	Employer Contributions	Investment Return	Market Value of Assets, EOY
2019	\$367,981,493	\$47,685,279	\$9,142,163	\$27,778,317	\$28,999,042	\$386,215,736
2020	386,215,736	43,128,491	9,462,139	29,167,233	30,713,514	412,430,131
2021	412,430,131	45,012,999	9,793,314	30,625,595	32,777,725	440,613,766
2022	440,613,766	46,867,617	10,136,080	32,137,145	34,998,778	471,018,152
2023	471,018,152	48,794,862	10,490,843	33,356,668	37,365,286	503,436,087
2024	503,436,087	50,712,085	10,858,023	34,623,676	39,890,829	538,096,530
2025	538,096,530	52,673,890	11,238,054	35,940,021	42,590,833	575,191,548
2026	575,191,548	54,610,998	11,631,386	37,307,632	45,483,045	615,002,613
2027	615,002,613	56,575,140	12,038,485	38,728,509	48,587,043	657,781,510
2028	657,781,510	58,568,239	12,459,832	40,204,733	51,922,203	703,800,039
2029	703,800,039	60,574,084	12,895,926	41,738,466	55,510,195	753,370,542
2030	753,370,542	63,299,918	13,347,283	43,331,955	59,345,818	806,095,680
2031	806,095,680	66,148,414	13,814,438	44,987,534	63,423,645	862,172,883
2032	862,172,883	69,125,093	14,297,943	46,707,629	67,758,781	921,812,143
2033	921,812,143	72,235,722	14,798,371	48,494,760	72,367,286	985,236,838
2034	985,236,838	75,486,329	15,316,314	50,351,547	77,266,245	1,052,684,615
2035	1,052,684,615	78,883,214	15,852,385	52,280,712	82,473,832	1,124,408,330
2036	1,124,408,330	82,432,959	16,407,218	12,716,765	84,829,406	1,155,928,760
2037	1,155,928,760	86,142,442	16,981,471	13,136,551	87,163,051	1,187,067,391
2038	1,187,067,391	90,018,852	17,575,822	13,571,031	89,463,233	1,217,658,625
2039	1,217,658,625	94,069,700	18,190,976	14,020,717	91,717,066	1,247,517,684
2040	1,247,517,684	98,302,837	18,827,660	14,486,142	93,910,185	1,276,438,834
2041	1,276,438,834	102,726,465	19,486,628	14,967,857	96,026,611	1,304,193,465
2042	1,304,193,465	107,349,156	20,168,660	15,466,432	98,048,604	1,330,528,005
2043	1,330,528,005	112,179,868	20,874,563	15,982,457	99,956,501	1,355,161,658
2044	1,355,161,658	117,227,962	21,605,173	16,516,543	101,728,544	1,377,783,956
2045	1,377,783,956	122,503,220	22,361,354	17,069,322	103,340,692	1,398,052,104
2046	1,398,052,104	128,015,865	23,144,001	17,641,449	104,766,415	1,415,588,104
2047	1,415,588,104	133,776,579	23,954,041	18,233,600	105,976,478	1,429,975,644
2048	1,429,975,644	139,796,525	24,792,432	18,846,476	106,938,695	1,440,756,722

SECTION 4 - REQUIRED DISCLOSURES

Exhibit 4.1 - GASB 67 and GASB 68 Disclosures

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, *Financial Reporting for Pension Plans*, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, replaced the requirements of Statement No. 27.

The new pension standards reflect changes from those currently in place regarding how governments calculate total pension liability and pension expense. Further, the new standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

GASB 67 requires defined benefit pension plans, such as the Lowell Contributory Retirement System, to present a statement of fiduciary net position (pension plan assets) and a statement of changes in fiduciary net position. Further, the statement requires that notes to financial statements include descriptive information such as the types of benefits provided, the classes of plan members covered and the composition of the pension plan's retirement board. Finally, GASB 67 requires pension plans to present in required supplementary information the sources of the changes in the net pension liability and information about the actuarially determined contributions compared with the actual contributions made to the plan and related ratios.

GASB 67 and GASB 68 require projected benefit payments be discounted to their actuarial present value using the single rate that reflects:

- (1) a long-term expected rate of return on pension plan investments *to the extent that the pension plan's assets are sufficient to pay benefits and pension plan assets are expected to be invested using a strategy to achieve that return and*
- (2) a tax-exempt, high-quality municipal bond rate *to the extent that the conditions for use of the long-term expected rate of return are not met.*

GASB 68 establishes standards for measuring and recognizing liabilities, deferred outflows of resources, deferred inflows of resources and pension expense by state and local governments.

The effective date for GASB 67 is for plan years beginning after June 15, 2013, which is fiscal year ending December 31, 2014 for the Lowell Contributory Retirement System. The effective date for GASB 68 is for employers' fiscal years beginning after June 15, 2014. The GASB report, submitted under separate cover and prepared as of December 31, 2018 (the measurement date), presents information to assist the Lowell Contributory Retirement System in providing the required information under GASB 68 to participating employers.

SECTION 4 - REQUIRED DISCLOSURES

Exhibit 4.2 - PERAC Disclosure Information

The most recent actuarial valuation of the System was prepared by KMS Actuaries, LLC as of January 1, 2019.

The normal cost for employees on that date was:	\$9,142,163	9.3% of payroll
The normal cost for the employer was:	\$6,683,051	6.8% of payroll

The actuarial liability for active members was:	\$266,167,055
The actuarial liability for retired and inactive members was:	398,103,735
Total actuarial liability:	\$664,270,790
System assets as of that date:	\$386,905,773
Unfunded actuarial accrued liability:	\$277,365,017

The ratio of System assets to total actuarial accrued liability was:	58.2%
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The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	7.65%
Rate of Salary Increase:	Based on service, 6% graded down to 4.25% for Group 1
	Based on service, 7% graded down to 4.75% for Group 4

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Administration There are 104 contributory retirement systems for public employees in Massachusetts. Each system is governed by a retirement board and all boards, although operating independently, are governed by Chapter 32 of the Massachusetts General Laws and other applicable statutes. This law in general provides uniform benefits, uniform contribution requirements and a uniform accounting and funds structure for all systems.

Participation Participation is mandatory for all full-time employees. Eligibility with respect to part-time, provisional, temporary, seasonal or intermittent employment is governed by regulations promulgated by the local retirement board, and approved by PERAC. Membership is optional for certain elected officials.

There are four classes of membership in the Retirement System:

- | | |
|----------|--|
| Group 1: | General employees, including clerical, administrative, technical and all other employees not otherwise classified. |
| Group 2: | Certain specified hazardous duty positions. |
| Group 3: | State police officers and inspectors. |
| Group 4: | Local police officers, firefighters and other specified hazardous positions. |

For members in more than one group, participation will be proportional.

Member Contributions Member contributions vary depending on the most recent date of membership:

Prior to 1975:	5% of Salary
1975 – 1983:	7% of Salary
1984 – June 30, 1996:	8% of Salary
July 1, 1996 – present:	9% of Salary
1979 – present:	An additional 2% of Salary in excess of \$30,000.
Group 1 members hired on or after April 2, 2012:	6% of Salary with 30 or more years of creditable service.

Rate of Interest Interest on regular deductions made after January 1, 1984 is a rate established by PERAC in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least ten financial institutions.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Retirement Age	The mandatory retirement age for some Group 2 and Group 4 members is age 65. Most Group 2 and Group 4 members may remain in service after reaching age 65. Group 4 members who are employed in certain public safety positions are required to retire at age 65. There is no mandatory retirement age for members in Group 1.
Salary	Gross regular compensation. This does not include bonuses, overtime, severance pay, unused sick leave credit or other similar compensation.
Average Salary	<p>Membership before April 2, 2012: Average annual rate of regular compensation received during the three consecutive years that produce the highest average, or, if greater, during the last three years (whether or not consecutive) preceding retirement.</p> <p>Membership on or after April 2, 2012: Average annual rate of regular compensation received during the five consecutive years that produce the highest average, or, if greater, during the last five years (whether or not consecutive) preceding retirement.</p>
Creditable Service	The period during which a member contributes to the retirement system plus certain periods of military service and "purchased" service.
Benefit Rate	The benefit rate varies with the member's retirement age, Group, membership date and years of creditable service at retirement. Each year a member retires prior to the age at which the 2.5% maximum benefit rate applies, a reduction is applied to each year of age under the maximum age. The maximum age and reduction for each Group and membership date is as follows:

	Group 1	Group 2	Group 4
2.5% for Membership before April 2, 2012:			
Maximum age:	65	60	55
Reduction:	0.1%	0.1%	0.1%
2.5% for Membership on or after April 2, 2012 (less than 30 years of service):			
Maximum age:	67	62	57
Reduction:	0.15%	0.15%	0.15%
2.5% for Membership on or after April 2, 2012 (30+ years of service):			
Maximum age:	67	62	57
Reduction:	0.125%	0.125%	0.125%

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Superannuation Retirement	Eligibility if membership before April 2, 2012:	<ul style="list-style-type: none"> • completion of 20 years of Creditable Service, or • attainment of age 55 if hired prior to 1978, or • attainment of age 55 with 10 years of Creditable Service, if hired after 1978.
	Eligibility if membership on or after April 2, 2012:	<ul style="list-style-type: none"> • attainment of age 60 with 10 years of Creditable Service if classified in Group 1 • attainment of age 55 with 10 years of Creditable Service if classified in Group 2 • attainment of age 55 if classified in Group 4
	Benefit Amount	Product of the member's Benefit Rate, Average Salary and Creditable Service.
	Maximum Benefit	80% of the member's Average Salary.
	Veteran's Benefit	Additional benefit of \$15 per year of Creditable Service, up to a maximum of \$300.
Deferred Vested	Eligibility	<ul style="list-style-type: none"> • completion of ten or more years of Creditable Service. • elected officials hired prior to 1978, completion of six years of Creditable Service.
	Benefit Amount	Accrued benefit payable commencing at age 55, or the completion of 20 years of Creditable Service, or may be deferred until later at the participant's option.
Withdrawal of Contributions		<p>Contributions may be withdrawn upon termination of employment.</p> <ul style="list-style-type: none"> • Members hired on or after January 1, 1984 who terminate with less than ten years of Creditable Service receive contributions plus interest on the Annuity Savings Account at an annual rate of 3%. • All other withdrawals receive contributions plus 100% of the regular interest that has accrued to the Annuity Savings Account.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Ordinary Disability Retirement	Eligibility	Non-job related disability after completion of ten years of Creditable Service.
	Benefit Amount for Group 1 membership before April 2, 2012 or Group 2 or Group 4	Superannuation benefit determined if the member is age 55, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
	Benefit Amount for Group 1 membership on or after April 2, 2012	Superannuation benefit determined if the member is age 60, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
Accidental Disability Retirement	Eligibility	Disabled as a result of an accident in the performance of duties. There is no minimum age or service requirement.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of Creditable Service, up to a maximum of \$300.
	Supplemental Dependent Allowance	Additional allowance of \$897.72 per year for each child until age 18 (or age 22 if a full-time student).
Non-Occupational Death	Eligibility	For members with at least two years of creditable service who die while in active service, but not due to occupational injury.
	Benefit Amount	Benefit as if Option C had been elected. Minimum benefit of \$250 per month for surviving spouse, \$120 per month for first child and \$90 per month for each additional child.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Accidental Death	Eligibility	For members who die as a result of an occupational injury.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of creditable service, up to a maximum of \$300.
	Supplemental Dependent Allowance	Additional allowance of \$897.72 per year for each child until age 18 (or age 22 if a full-time student).
Cost-of-Living Adjustment (COLA)	In accordance with the adoption of Chapter 17 of the Acts of 1997, the granting of a Cost-of-Living Adjustment will be determined by an annual vote by the Retirement Board. The amount of increase will be based upon the Consumer Price Index, limited to a maximum of 3.0%, beginning on July 1. All retirees, disabled retirees and beneficiaries who have been receiving benefit payments for at least one year as of July 1 are eligible for the adjustment. The maximum amount of pension benefit subject to a COLA is \$17,000. All COLAs granted to members after 1981 and prior to July 1, 1998 are deemed to be an obligation of the Commonwealth of Massachusetts and are not the liability of the Retirement System.	
Optional Forms of Payment	A member may elect to receive his or her retirement allowance, payable in monthly installments, in one of three forms of payment: <ul style="list-style-type: none">• Option A – Total annual allowance commencing at retirement and terminating at member's death.• Option B – A reduced annual allowance commencing at retirement with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefit paid to member.• Option C – A reduced annual allowance commencing at retirement with 66⅔% of benefit continued to designated beneficiary upon death of member. For members who retired on or after January 12, 1988, if the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement. For members who retired prior to January 12, 1988, if the System has accepted Section 288 of Chapter 194 of the Acts of 1998 and the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement.	

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Valuation Date January 1, 2019

Investment Return 7.65% per year. Previously, 7.75% per year.
The investment return assumption is a long-term assumption based on capital market expectations by asset class, historical returns and professional judgment. We considered analysis prepared by PRIM's investment advisor using a building block approach and using the target asset allocation, expected returns by asset class and risk analysis to determine a long-term expected average annual rate of return.

Annuity Savings Fund Interest Rate 2.00% per year

Amortization Method *Unfunded Actuarial Accrued Liability (UAL):*
Increasing dollar amount at 4% to reduce the Unfunded Actuarial Accrued Liability to zero on or before June 30, 2036.

Early Retirement Incentive Programs (ERI) for 2003:
Level dollar amount to reduce the Unfunded Actuarial Accrued Liability attributable to the 2003 ERI to zero on or before June 30, 2020.

Salary Scale The assumed annual rates for salary increases including longevity are illustrated by the following rates:

Years of Service	Groups 1 and 2	Group 4
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.00%
3	5.25%	5.75%
4	5.25%	5.25%
5	4.75%	5.25%
6	4.75%	4.75%
7	4.50%	4.75%
8	4.50%	4.75%
9+	4.25%	4.75%

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations and professional judgment.

Cost-of-Living Allowance

Cost-of-Living Allowances (COLA) are assumed to be 3% of the pension amount, capped at \$510 per year.

Mortality Rates

RP-2000 Mortality Table (base year 2009) with full generational mortality improvement using Scale BB. For disabled members, RP-2000 Mortality Table (base year 2012) with full generational mortality improvement using Scale BB.

General Employees: 55% of deaths are job-related.

Police and Fire: 90% of deaths are job-related.

The underlying tables with generational mortality improvement reasonably reflect the mortality experience of the System as of the valuation date based on historical and current demographic data. Further, PERAC reviewed a sampling of a few larger local retirement systems and compared the results with the results found in performing the analysis of the State Retirement System for years 2012 - 2014. For the State Retirement System analysis, the mortality assumptions reflect the recent experience study published in 2014.

Turnover Rates

Illustrative turnover rates are shown below:

Creditable Service	Groups 1 and 2	Group 4
0	0.1500	0.0150
10	0.0540	0.0150
20	0.0200	0.0000
30	0.0000	0.0000

Disability Rates

Illustrative disability rates are shown below:

Attained Age	Groups 1 and 2	Group 4
20	0.0001	0.0010
30	0.0003	0.0030
40	0.0010	0.0030
50	0.0019	0.0125
60	0.0028	0.0085

General Employees: 55% of disabilities are accidental and 45% are ordinary.

Police and Fire: 90% of disabilities are accidental and 10% are ordinary.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Retirement Rates

Illustrative retirement rates are shown below:

Age	Groups 1 and 2		Group 4
	Male	Female	Male & Female
45	0.0000	0.0000	0.0100
46	0.0000	0.0000	0.0100
47	0.0000	0.0000	0.0100
48	0.0000	0.0000	0.0100
49	0.0000	0.0000	0.0100
50	0.0100	0.0150	0.0200
51	0.0100	0.0150	0.0200
52	0.0100	0.0200	0.0200
53	0.0100	0.0250	0.0500
54	0.0200	0.0250	0.0750
55	0.0200	0.0550	0.1500
56	0.0250	0.0650	0.1000
57	0.0250	0.0650	0.1000
58	0.0500	0.0650	0.1000
59	0.0650	0.0650	0.1500
60	0.1200	0.0500	0.2000
61	0.2000	0.1300	0.2000
62	0.3000	0.1500	0.2500
63	0.2500	0.1250	0.2500
64	0.2200	0.1800	0.3000
65	0.4000	0.1500	1.0000
66	0.2500	0.2000	1.0000
67	0.2500	0.2000	1.0000
68	0.3000	0.2500	1.0000
69	0.3000	0.2000	1.0000
70	1.0000	1.0000	1.0000

The turnover, disability and retirement rates are based on PERAC's most recent experience analysis of local retirement systems which reviewed age, gender and job group. The assumptions reflect this analysis as well as professional judgment.

Actuarial Cost Method

Individual Entry Age Normal.

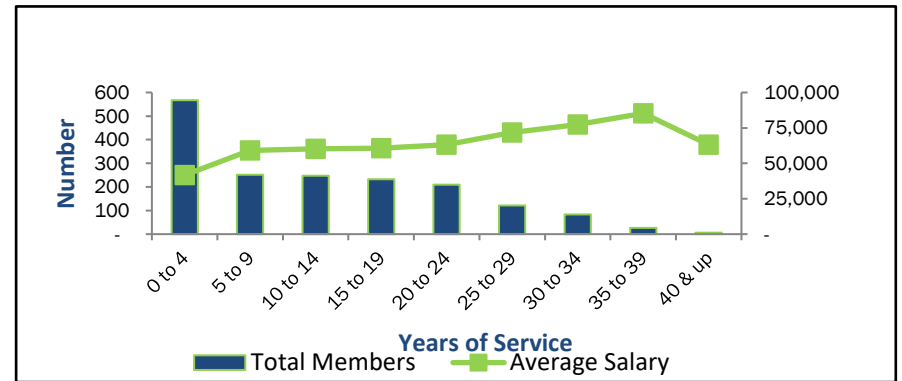
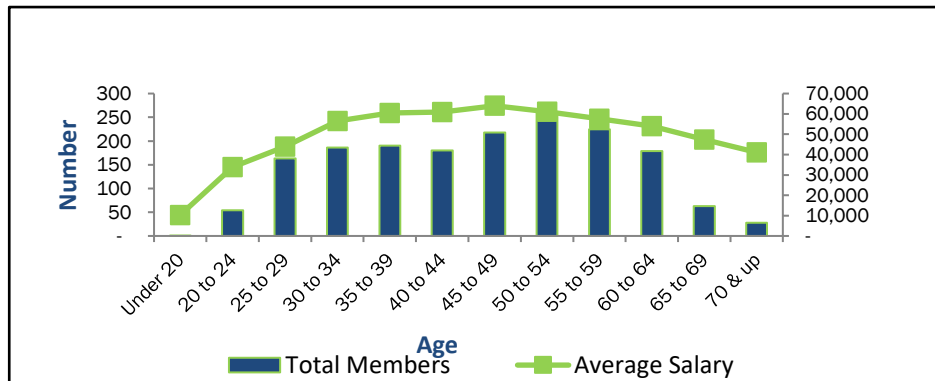
SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Asset Method	<p>The Actuarial Value of Assets is the market value of assets as of the valuation date reduced by the sum of:</p> <ul style="list-style-type: none">a) 80% of gains and losses of the prior year,b) 60% of gains and losses of the second prior year,c) 40% of gains and losses of the third prior year andd) 20% of gains and losses of the fourth prior year. <p>Investment gains and losses are determined by the excess or deficiency of the expected return over the actual return on the market value. The actuarial valuation of assets is further constrained to be not less than 90% or more than 110% of market value.</p>
Census Data	Census data as of the valuation date were submitted by the Retirement Board.
Asset Data	Asset information is reported annually to the Public Employee Retirement Administration Commission by the Lowell Contributory Retirement System.
Dependents	80% of all members will be survived by a spouse. Age assumption for spouses is that males are assumed to be three years older than females.
Net Section 3(8)(c) Transfers	Reimbursements paid to and received from other retirement systems for that portion of a retiree's pension that is based on service earned in another retirement system. Net 3(8)(c) transfers are assumed to be \$750,000 per year.
Administrative Expenses	<p>The anticipated administrative expenses for the fiscal year. For Fiscal Year 2020, the administrative expenses were assumed to be \$400,000 and are anticipated to increase 4% per year.</p> <p>The administrative expense assumption is based on information relating to the System's administrative expenses provided by the Retirement System.</p>

SECTION 7 - PLAN MEMBER INFORMATION

Exhibit 7.1 - ACTIVE MEMBERS BY AGE and YEARS OF SERVICE AS OF JANUARY 1, 2019

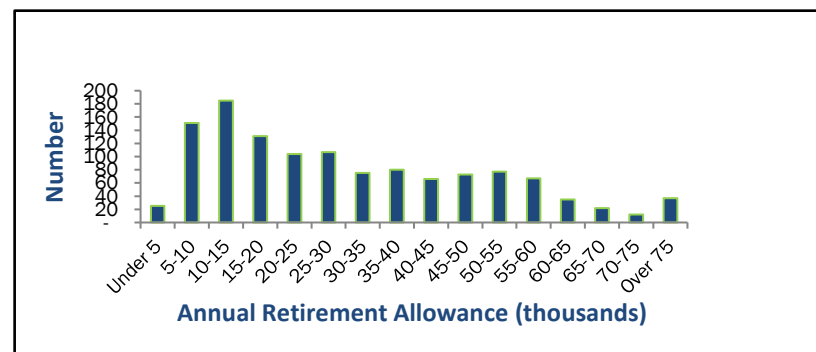
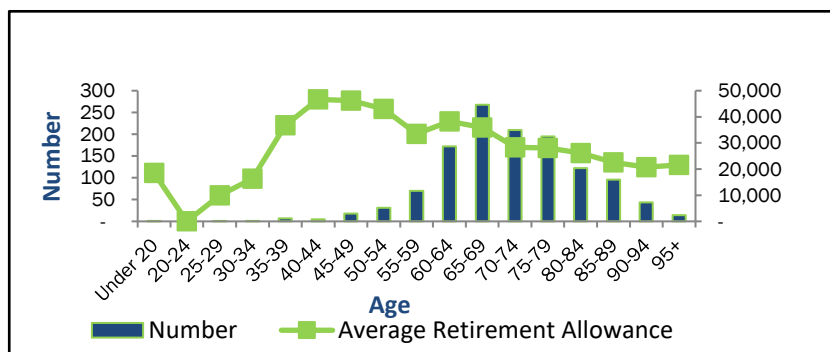
Age	Years of Service									Total	Total Salary	Average Salary
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up			
Under 20	1	-	-	-	-	-	-	-	-	1	10,299	10,299
20 to 24	53	1	-	-	-	-	-	-	-	54	1,830,590	33,900
25 to 29	136	26	1	-	-	-	-	-	-	163	7,147,831	43,852
30 to 34	103	66	17	-	-	-	-	-	-	186	10,507,117	56,490
35 to 39	68	58	50	13	1	-	-	-	-	190	11,494,556	60,498
40 to 44	57	18	42	42	20	1	-	-	-	180	10,972,069	60,956
45 to 49	42	25	31	51	49	19	1	-	-	218	13,950,836	63,995
50 to 54	44	22	40	41	46	39	27	-	-	259	15,834,725	61,138
55 to 59	32	19	30	42	39	26	26	11	-	225	12,963,189	57,614
60 to 64	22	11	21	28	41	20	19	14	3	179	9,675,207	54,051
65 to 69	6	6	14	10	11	9	5	2	-	63	2,989,578	47,454
70 & up	3	-	2	6	2	7	5	-	3	28	1,148,602	41,022
Total	567	252	248	233	209	121	83	27	6	1,746	98,524,601	56,429
Average Salary	41,676	58,997	60,156	60,716	63,120	71,649	77,319	85,297	63,246			
Average Age:							46.40	Average Service:		12.60		



SECTION 7 - PLAN MEMBER INFORMATION

Exhibit 7.2 - Retired Plan Members and Beneficiaries Annual Pensions as of January 1, 2019

Attained Age	Service Retirements		Disability Retirements		Beneficiaries	
	Number	Annual Retirement Allowance	Number	Annual Retirement Allowance	Number	Annual Retirement Allowance
Under 20	0	0	0	0	1	18,591
20-24	0	0	0	0	0	0
25-29	0	0	0	0	1	9,919
30-34	0	0	0	0	1	16,385
35-39	0	0	5	217,218	2	40,301
40-44	0	0	5	233,307	0	0
45-49	1	27,223	15	753,181	2	51,893
50-54	3	106,250	19	901,303	9	326,993
55-59	50	1,643,901	15	616,228	5	80,918
60-64	138	5,309,924	23	1,091,692	11	178,413
65-69	211	7,364,031	39	1,817,272	18	435,757
70-74	156	4,304,890	29	1,183,629	25	457,480
75-79	149	4,226,784	18	724,760	28	533,465
80-84	83	2,254,051	15	524,348	24	404,955
85-89	61	1,448,453	6	206,590	29	516,205
90-94	20	377,872	4	116,370	20	418,776
95+	3	45,108	2	53,468	9	203,399
Total	875	27,108,487	195	8,439,366	185	3,693,450
Average Age	72.0		65.8		76.4	
Average Retirement Allowance		30,981		43,279		19,965



SECTION 8 - GLOSSARY OF TERMS

Actuarial Accrued Liability – That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

Actuarial Assumptions – Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the commencement, amount and duration of pension benefits, such as: changes in compensation, mortality, withdrawal, disablement and retirement; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

Actuarial Cost Method (or Funding Method) – A procedure for allocating the Actuarial Present Value of all past and future pension plan benefits to the current year (Normal Cost) and the past (Actuarial Accrued Liability).

Actuarial Gain or Loss (or Experience Gain or Loss) – A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between the valuation date and the most recent immediately preceding valuation date.

Actuarial Present Value – The dollar value on the valuation date of all benefits expected to be paid to current members based upon the Actuarial Assumptions and the terms of the Plan.

Amortization Payment – That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability.

Annual Statement – The statement submitted by the local retirement board to PERAC each year that describes the asset holdings and Fund balances as of December 31 and the transactions during the calendar year that affected the financial condition of the retirement system.

Annuity Reserve Fund – The fund into which total accumulated Member Contributions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

Annuity Savings Fund – The fund in which Member Contributions plus interest credited are held for active members and for former members who have not withdrawn their contributions and are not yet receiving a benefit (inactive members).

Assets – The total value of the investments held by the Plan trust that are for the payment of promised benefits. Employer appropriations and Member Contributions, as well as investment earnings, are added to the Plan trust. Benefit payments and other disbursements are withdrawn from the Plan trust. For valuation purposes, assets are usually measured at market value.

Cost of Benefits – The estimated payment from the pension system for benefits for the fiscal year.

SECTION 8 - GLOSSARY OF TERMS

Expense Fund – The fund into which the appropriation for administrative expenses is paid and from which all such expenses are paid.

Funded Ratio – The Actuarial Value of Assets expressed as a percentage of the Actuarial Accrued Liability.

Funding Schedule – The schedule based upon the most recently approved actuarial valuation which sets forth the amount which would be appropriated to the pension system in accordance with Section 22D of M.G.L. Chapter 32.

GASB – Governmental Accounting Standards Board.

Normal Cost – Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is expected to accrue in the current fiscal year. The Employee Normal Cost is the amount of the expected Member Contributions for the current fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

Pension Fund – The fund into which appropriation amounts as determined by PERAC are paid and from which pension benefits are paid.

Pension Reserve Fund – The fund which shall be credited with all amounts set aside by a system for the purpose of establishing a reserve to meet future pension liabilities. These amounts would include excess interest earnings.

Present Value of Future Benefits – The actuarial present value of the cost to finance benefits payable in the future, discounted to reflect the expected effects of the time value of money and the probabilities of payment.

Special Fund for Military Service Credit – The fund which is credited with amounts paid by the retirement board equal to the amount which would have been contributed by a member during a military leave of absence as if the member had remained in active service of the retirement board. In the event of retirement or a non-job related death, such amount is transferred to the Annuity Reserve Fund. In the event of termination prior to retirement or death, such amount shall be transferred to the Pension Fund.

Total Pension Liability – The portion of the Actuarial Present Value attributable to past service in accordance with the Entry Age cost method as stipulated by GASB Statement Number 67 (GASB 67).

Unfunded Actuarial Accrued Liability – The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.